Registration of 95SR316A Stripe Rust-Resistant Two-Rowed Barley Germplasm

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95SR316A (Reg. No. GP-180, PI 644104) is a two-rowed barley (Hordeum vulgare L.) germplasm line developed and released in 2007 by the Agricultural Research Service, U.S. Department of Agriculture. 95SR316A has favorable values for most agronomic and malt quality characteristics, and it is resistant to many races of barley stripe rust (Puccinia striiformis Westend. f. sp. hordei Eriks.).

95SR316A has the pedigree ‘Bancroft’/‘Crystal’. Both parents were developed by the USDA-ARS in Aberdeen, ID. Crystal (PI 531249; Wesenberg et al., 1991) has good agronomic characteristics and was recommended by the American Malting Barley Association (AMBA) for malting and brewing from 1990 through 2001. Bancroft (PI 605474; Wesenberg et al., 2001) combined favorable agronomic and malt quality characteristics with resistance to most races of barley stripe rust, but did not receive recommendation as a malt barley from AMBA. Bancroft has been reported to have non-race specific high-temperature, adult-plant (HTAP) resistance, which has proven to be durable (Chen and Moore, 2002). The genetics of resistance in Bancroft have not been fully described, but recent work (Yan and Chen, 2007) has indicated the presence of a major QTL associated with high-temperature adult plant resistance.

95SR316A is a spring, two-rowed, hulled barley with a semi-lax spike that remains upright at maturity. Awns are rough, rachilla hairs are long, glume hairs are banded, hulls are wrinkled, kernels have a transverse crease at the base, and the aleurone is white.

95SR316A originated as an F₄₅ spike selection and tested as headrow #316A in 1995, and was entered into preliminary yield nurseries at Aberdeen and Tetonia, ID in 1996. The initial selection was based on visual observations for favorable plant and spike characteristics, and for resistance to barley stripe rust in Cochabamba, Bolivia. Subsequent selection was based on agronomic performance in replicated yield trials, and continued resistance to stripe rust in field trials conducted from 1997 through 2004 in various locations: Toluca, Mexico; Huancayo and Callejón de Huaylas, Peru; Davis, California and Mt. Vernon, Washington. At locations where the resistant check, ‘Russell’, showed high levels of infection, 95SR316A typically showed the same resistance reaction as the resistant check, Bancroft, which was either no infection or 5 to 20 S or 5 to 20MS (Table 1). Tests of the resistant check, Bancroft, in Davis, CA, and various locations in 2005 and 2006 where stripe rust was present showed high levels of infection; thus, the source of resistance in 95SR316A has not yet shown evidence of a breakdown in usefulness in these environments. Although races of stripe rust virulent on seedlings of Bancroft are present in the United States, including races 54–56, 58–69, 71, and 74 (Clemmons, personal communication, 2006), the HTAP resistance in Bancroft is non-race specific and should be durable (Chen and Moore, 2002). However, because the HTAP resistance is non-race specific and should be durable (Chen and Moore, 2002). However, because the HTAP resistance may not be adequate under high rust pressure in the early growth stages. Therefore, the resistance genes may be most effective if combined with other sources.

95SR316A has not been rigorously tested for resistance to diseases other than stripe rust. However, susceptible races of stripe rust (incited by Puccinia hordei Otth), powdery mildew (incited by Erysiphe graminis DC. f. sp. hordei Em. Marchal), and moderate susceptibility to net blotch (incited by Pyrenophora teres Drechs.) have been noted.

Yield trials of 95SR316A have been conducted on irrigated and rain-fed locations in Idaho from 1998 through 2007. Comparisons to Bancroft and Harrington showed 95SR316A to be 1.4 and 2.1 d later heading; 103% and 106% for 113% for grain yield; 100% and 101% for test weight; and 101% and 104% for percentage plump kernels, respectively (Table 1).